

REMARKS

Claims 1-5 and 8 have been rejected under 35 USC 103(a) as being unpatentable over Fujino et al in view of Horowitz et al. Claims 6 and 7 have been rejected under 35 USC 103(a) as being unpatentable over Fujino et al in view of Horowitz et al and further in view of Kumta et al. Applicants respectfully traverse these grounds of rejection and urge reconsideration in light of the following comments.

As explained previously, the instant invention is directed to a method for producing a cathode material for a lithium secondary cell which comprises the steps of preparing a solution selected from the group consisting of an alkaline solution, a carbonate solution and a hydrogen carbonate solution, with either an oxide or a carbonate of a metal, as a major component of the cathode material with a lithium secondary cell, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, as a major component, preparing a mixture by mixing the oxide or the carbonate of the metal, as the major component, with the compound of the other element, precipitated and bonded thereon, with a lithium compound, and firing the mixture.

The present invention requires the precipitation and bonding of a compound of a dopant element on the surface on the compound of a metal as a major component, mixing this product with a lithium compound and firing this mixture to form the cathode material. The instant invention is based on the discovery that when doping a cathode material for a lithium secondary cell, if a compound of a doping element is first precipitated and bonded on the surface of a compound of a metal, as a major component of the cathode material for its lithium secondary cell, in powdery form, by the use of a chemical method and, subsequently, the compound of the metal having the doping element deposited thereon is mixed with a

lithium compound and subsequently fired, a cathode material is obtained which gives the lithium secondary cell excellent initial capacity, cycle characteristics and safety. This is believed to be due to the cathode material having a very high doping uniformity as compared with prior art cathode materials. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Fujino et al reference discloses a cobalt-coated lithium manganese complex oxide which is prepared, as disclosed in paragraphs [0073] and [0074], by dispersing a powder of lithium manganese complex oxide in an alkali solution, adding a cobalt compound to the dispersion, subjecting the dispersion to an oxidation reaction so that a cobalt oxide grows epitaxially on the lithium manganese complex oxide and collecting the resultant precipitate by filtration, purification and drying. This process produces a cobalt-coated lithium manganese complex oxide which is useful as an active material of a positive electrode for a secondary battery with a non-aqueous electrolyte in order to realize the high level balance between charge-discharge capacity and cycle characteristics, as discussed in paragraph [0018] of this reference.

It is apparent from the above discussion that the object of Fujino et al is expressly different from that of the present invention and, as such, the process steps necessarily would be different since the ultimate products to be produced are different. As the Examiner is well aware, the electrode material of Fujino et al is designed to be used as an anode and not a cathode as required by the present claims. Therefore, the secondary references cited by the Examiner just provide the motivation to one of ordinary skill in the art to modify the primary reference in a manner that would yield the presently claimed invention. It is respectfully submitted that the secondary reference contains no such disclosures.

The Horowitz et al reference discloses the use of high surface area mixed metal oxides of manganese and calcium in electrochemical processes. This reference has been cited by the Examiner as disclosing a firing process that removes impurities in mixed metal oxides in column 5, lines 1-6 and 11-17. However, the present invention is not concerned with the removal of impurities by utilizing a firing process. As is readily evident from the present specification at page 8, lines 1-6, and the explanation in the embodiments, the firing process in the present invention is used to synthesize a compound oxide comprising lithium and a major metal from the mixture of the oxide or the carbonate of the major metal a the lithium compound. Moreover, even if this reference provides the motivation to one of ordinary skill in the art to fire the composition of the primary reference, keeping that the composition of the primary reference is different from that of the present invention, the presently claimed product still would not be obtained. Therefore, Horowitz in combination with the primary Fujino et al reference does not even present a showing of prima facie obviousness under 35 USC 103(a).


The Kumta et al reference discloses cathode materials for lithium-ion secondary cells. This reference has been cited by the Examiner as teaching a lithium cobalt oxide doped with magnesium cathode material and that these materials improve cyclability and provide high voltage capacity as cathodes in lithium-ion secondary cells. However, since the primary Fujino et al reference is concerned with anodes, any disclosure in Kumta et al with respect to cathode materials would not be extended to the Fujino et al reference by one of ordinary skill in the art. Therefore, Kumta et al in combination with the previously discussed references do not even present a showing of prima facie obviousness under 35 USC 103(a).

With respect to the primary Fujino et al reference, the Examiner states that it would be obvious to one of ordinary skill in the art to chance the sequence of adding ingredients

in order to facilitate production. However, in the present invention, specific reactions are taking place at each step and, as a result, different reaction products of those of Kumta et al are being acted on in each succeeding step. When the process steps of a reference are different from that of the claimed invention and different reaction products are produced at each of the process steps, it would not be obvious to vary the process steps since different materials are being obtained.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,



Terryence F. Chapman

TFC/smd

FLYNN, THIEL, BOUTELL
& TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
Fax: (269) 381-5465

Dale H. Thiel	Reg. No. 24 323
David G. Boutell	Reg. No. 25 072
Terryence F. Chapman	Reg. No. 32 549
Mark L. Maki	Reg. No. 36 589
Liane L. Churney	Reg. No. 40 694
Brian R. Tumm	Reg. No. 36 328
Steven R. Thiel	Reg. No. 53 685
Donald J. Wallace	Reg. No. 43 977
Sidney B. Williams, Jr.	Reg. No. 24 949

Encl: Postal Card

136.07/05